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(54) Terminal unit for IC card using plural protocols and control method therefor

(57) A data processing apparatus for IC card mediums having a function (15, 16, S104) for holding one of the portable mediums and supplying a clock signal to the held medium for the purpose of establishing communication with the portable medium in the synchronous communication protocol, a function (11, S105, S106, S117, S107, S108, S113, S109) for determining whether the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with data transmitted from the held medium in response to the clock signal, a function (11, S110, S111) for continuing a subsequent communication with the held medium in the synchronous communication protocol when a determination has been made that the synchronous communication protocol is used, and a function (11, S114, S115, S116, S118) for supplying a clock signal to the held medium for the purpose of establishing communication with the portable medium in the asynchronous communication protocol when a determination has been made that the asynchronous communication protocol is used.

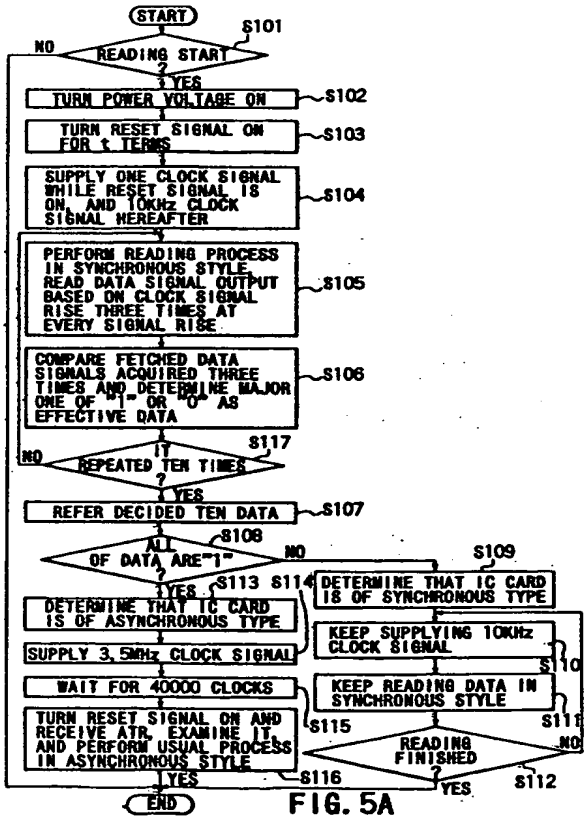

FIG. 5A

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Description

The present invention relates to a terminal unit for an IC card which is capable of reading various trading data and data about an amount of money from the IC card serving as a credit card or electronic money and a control method therefor.

IC cards are used to serve as portable storage mediums each comprising a nonvolatile memory and an IC chip for controlling the nonvolatile memory.

When an IC card of the foregoing type is used as a credit card or electronic money, it is a convenient fact that various trading data or data about an amount of money can be read by a user of the IC card as necessary.

To meet the above-mentioned requirement, a portable terminal unit for an IC card (including a desktop type terminal unit as well as the portable type terminal unit) is known which permits a user to always carry the terminal unit. The foregoing terminal unit is formed into a card-like shape similarly to the IC card and comprising a keyboard, a liquid crystal display section and battery. When an IC card is inserted into the terminal unit, various trading data or data about an amount of money is read from the IC card in response to the operation of the keyboard. Then, the terminal unit displays read data on the liquid crystal display section thereof.

IC cards include IC cards of a type comprising a CPU and having a structure adapted to an asynchronous protocol so that data is transmitted in response to supply of a clock and a command from outside. Moreover, the IC cards include IC cards of a type having no CPU and arranged in such a manner as to serially transmit data in synchronization with supply of a clock signal from outside.

A process for reading data from the IC card adapted to the asynchronous protocol and that from the IC card adapted to the synchronous protocol are different from each other. Therefore, there arises a problem in that plural types of terminal units for IC cards must be prepared to be adaptable to the above-mentioned types of the protocols.

An object of the present invention is to provide a terminal unit for IC cards which is capable of processing data of both of an asynchronous communication protocol type IC card and a synchronous communication protocol type IC card and which exhibits satisfactory flexibility and a method of controlling the terminal unit for IC cards.

According to one aspect of the present invention, there is provided a data processing apparatus receiving portable mediums, the apparatus communicates with the portable mediums in a synchronous communication protocol and an asynchronous communication protocol, comprising: first supply means (15, 16, S104) for holding one of the portable mediums and supplying a first clock signal to the held medium for the purpose of establishing communication with the portable medium in the synchronous communication protocol; means (11, S105, S106, S117, S107, S108, S113, S109) for determining whether the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with data transmitted from the held medium in response to the first clock signal; means (11, S110, S111) for continuing a subsequent communication with the held medium in the synchronous communication protocol when the determining means has determined that the portable medium uses the synchronous communication protocol; and second supply means (11, S114, S115, S116, S118) for supplying a second clock signal to the held medium for the purpose of establishing communication with the portable medium in the asynchronous communication protocol when the determining means has determined that the portable medium uses the asynchronous communication protocol.

The present invention having the above-mentioned structure is able to eliminate a necessity of preparing an exclusive terminal unit for the synchronous communication protocol and that for the asynchronous protocol. That is, only when the IC medium is inserted into the terminal unit, a clock signal is supplied on the assumption that the protocol is the synchronous protocol regardless of the protocol. Then, a signal is read from the IC medium in response to the supplied clock signal. Then, the protocol of the inserted IC card is determined in accordance with the read signal so that a proper communication protocol is automatically selected. As a result, one terminal unit is able to process portable mediums of both protocol types.

Also a method of controlling the portable mediums permits only one terminal unit to automatically determine the protocol to realize the required process because of the same reason.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view showing the shape of a first embodiment and an IC card;

FIG. 2 is a block diagram showing a control circuit according to the first embodiment;

FIG. 3 is a block diagram showing a control circuit in an IC card adapted to an asynchronous communication protocol;

FIG. 4 is a block diagram showing a control circuit in an IC card adapted to a synchronous communication protocol;

FIG. 5A is a flow chart showing the operation of the first embodiment;

FIG. 5B is a flow chart showing the operation of another embodiment;

FIG. 6 is a time chart showing the operation of the other embodiment; and

FIG. 7 is a time chart showing a synchronous protocol type reading process according to the other

embodiment.

A first embodiment of the present invention will now be described with reference to the drawings.

Referring to FIG. 1, reference numeral 1 represents a body of a terminal unit for an IC card, the body 1 being formed into a card-like shape having a liquid crystal display section 2 and a keyboard 3 on the upper surface thereof. The liquid crystal display section 2 is a section on which various data is displayed The keyboard 3 serves as a means for inputting a password and other data.

A card insertion opening 4 is formed in the side surface of the body 1 to permit insertion of the IC card 5a (5b).

The IC card 5a (5b) serves as a credit card, a point cumulative medium or a prepaid card and having a contact section 6 formed at a predetermined position on either of the surfaces thereof. The contact section 6 establishes the electrical connection between the body 1 and the IC card 5a (5b) and comprises a plurality of terminals including a power supply terminal, a reset terminal, a clock terminal and an input/output (I/O) terminal.

FIG. 2 shows a control circuit in the body 1, the control circuit having a control section 11 for controlling the overall body of the apparatus. A keyboard 3, a ROM (Read Only Memory) 12, a RAM (Random Access Memory) 13, a display driver 14, an IC-card interface (I/F) 15 and a battery 18 are connected to the control section 11.

The control section 11 includes a CPU and a power supply circuit. The power supply circuit receives the voltage (for example, 3 V) of the battery 18, and then converts the voltage into operation voltage for the control section 11 and that for the IC card. The operation voltage (for example, 5 V) for the IC card is supplied to the IC-card interface 15.

The ROM 12 has control program stored thereon. The RAM 13 serves as a work memory. The display driver 14 operates the liquid crystal display section 2.

The IC-card interface 15 establishes the connection with the IC card 5a (5b) and makes an access to the same. The IC-card interface 15 has a clock circuit 16 and a switching circuit 17. The clock circuit 16 transmits a clock signal having a predetermined frequency. The switching circuit 17 selectively switches the frequency of the clock signal generated by the clock section 16 into either of a frequency of 3.5 MHz for operating (for reading data from) the IC card adapted to the asynchronous protocol or a frequency of 10 KHz for operating (for reading data from) the IC card adapted to the synchronous protocol. The frequency of 10 KHz is generated by the operation of the control section 11 for controlling the frequency of 3.5 MHz.

On the other hand, the IC card 5a is an IC card (hereinafter called an "asynchronous protocol type IC card") having a CPU and adapted to the asynchronous protocol for transmitting data in response to supply of a clock signal and a command from outside. As shown in FIG. 3, the IC card 5a is formed by a contact section 6 and an IC chip 21.

The IC chip 21 comprises a CPU 22, a ROM 23 having a control program stored thereon, a RAM 24 serving as a work memory and an EEPROM 25 which is a nonvolatile memory on which data is stored.

In addition, to the asynchronous protocol type IC card 5a, an IC card 5b is prepared.

The IC card 5b is an IC card (hereinafter called a "synchronous protocol type IC card") having no CPU and adapted to the synchronous protocol for serially transmitting data one by one in synchronization with a clock signal supplied from outside. The IC card 5b comprises a contact section 6 and a IC chip 31, as shown in FIG. 4.

The IC chip 31 comprises a control circuit 32, a program memory 33 and an EEPROM 34 which is a nonvolatile memory on which data is stored.

The control section 11 of the body 1 of a system comprising the terminal unit for the IC card and the IC cards of the foregoing type has the following functional means.

(1) A first reading means for supplying, to the IC card (5a or 5b) inserted into the card insertion opening 4, a clock signal for operation (for reading data), a reset signal and operation power supply voltage for the IC card 5b.
(2) A determining means for determining that the inserted IC card is the asynchronous protocol type IC card 5a or the synchronous protocol type IC card 5b in accordance with data read by the first reading means.
(3) A control means for continuing the process which has been performed by the first reading means if a result of determination made by the determining means is the synchronous protocol type IC card 5b.
(4) A second reading means for supplying, to the inserted IC card 5a, a clock signal for operation (for reading data), a reset signal and an operation power supply voltage for the asynchronous protocol type IC card 5a if a result of determination made by the determining means is the asynchronous protocol type IC card 5a.
(5) A control means for displaying data read by the first reading means or the second reading means on the liquid crystal display section 2.

The operation of the above-mentioned structure will now be described with reference to a flow chart shown in FIGS. 5A and 5B and a time chart shown in FIGS. 6 and 7.

Referring to FIG. 5A, when either of the IC card 5a or the IC card 5b is inserted into the card insertion opening 4 and start of reading data is instructed by

using the keyboard 3 (YES in step S101), power source voltage VCC is supplied to the inserted IC card (step S102).

A reset signal RST, which is turned on (the level of which is raised to a high level) for a predetermined period of time, is supplied to the inserted IC card (step S103). Then, one clock signal CLK is supplied during the period in which the reset signal RST is turned on. Then, clock signals CLK each having a frequency of 10 KHz are supplied (step S104).

When the reset signal RST and clock signal CLK have been supplied, a process for reading data from the synchronous protocol type IC card 5b is performed. A data signal is read from the inserted IC card at each rising edge of the clock signal CLK so that read data for each bit is fetched three times (or odd-number times) (step S105).

If the inserted IC card is the synchronous protocol type IC card 5b having no CPU, data in the synchronous protocol type IC card 5b for each bit is serially read at the rising edge of the clock signal CLK having the frequency of 10 KHz, as shown in the time chart shown in FIG. 7. That is, data a is read in synchronization with the first rising edge of the clock signal CLK. Data b is read in synchronization with the second rising edge of the clock signal CLK. Data c is read in synchronization with the third rising edge of the clock signal CLK. As described above, data is sequentially read. Timing when data is fetched for each bit is indicated by an arrow. Thus, fetching is performed three times for each of data a, b, c, d, • • •.

Three data items for each of the fetched bits are compared with one another. The contents of read data are determined for each bit on the basis of the contents of majority data. That is, much one of "1" or "0" of the three data items is determined as effective data (step S106).

As described above, data is fetched three times for each bit to determine data. Thus, improper reading because of noise or the like can be prevented. Note that the number of fetching times is not limited to three times and appropriate odd number of times, for example, five times or seven times, may be employed if the majority and minority can be generated.

Determined effective data is displayed on the liquid crystal display section 2.

The above-mentioned process is repeated to make references until a predetermined number of, for example, 10 bits is obtained from determined effective data (steps S107 and S117) to determine whether or not the content is the common "1" (step S108).

If the inserted IC card is the synchronous protocol type IC card 5b having no CPU, serial data output for each bit is sequentially performed. Therefore, data of 10 bits is in the form in which "1" and "0" are arbitrarily mixed with one another. When the foregoing state is realized, the card has no data.

FIG. 5B shows another example for determining whether the IC card is a synchronous protocol type card or an asynchronous protocol type card. Since the other steps shown in FIG. 5B are the same as those shown in FIG. 5A, the same steps are omitted from description. In step S118, if the signal obtained from the IC card is determined that the signal has been regulated as a signal which is first transmitted from a synchronous protocol type IC card, a determination can be made that the inserted IC card is the synchronous protocol type IC card without a necessity of performing the determination shown in FIG. 5A (step S118).

If the inserted IC card is the asynchronous protocol type IC card 5a having a CPU, the IC card transmits data in response to only a command supplied from outside. Therefore, ten data items are formed in such a manner that "1" successively appears in place of the original form.

If the contents of ten data items are not common "1" (NO in step S108), a determination is made that the IC card inserted into the card insertion opening 4 is the synchronous protocol type IC card 5b (step S109). When a result of determination has been made that the inserted card is the synchronous protocol type IC card 5b, supply of clock signals CLK each having the frequency of 10 KHz is continued (step S110). Thus, a process of reading data from the synchronous protocol type IC card 5b is continued until completion of the reading process is instructed by using the keyboard 3 (steps S111 and S112).

If the contents of ten data items are common "1" (YES in step S108), a determination is made that the IC card inserted into the card insertion opening 4 is the asynchronous protocol type IC card 5a (step S113).

In the foregoing case, the clock signal CLK which must be supplied is switched from 10 KHz for the synchronous protocol type IC card to 3.5 MHz for the asynchronous protocol type IC card (step S114). Then, a waiting process is performed for a period of type which corresponds to 40,000 clocks determined on the basis of the clock signal CLK having the frequency of 3.5 MHz (step S115). Then reset signal RST which is always turned on (the level of which is high level) is supplied. At this time, ATR is received from the IC card. The ATR is determined, and then a usual process (the reading process or the like) for the asynchronous protocol type IC card is performed (step S116). The waiting process which is performed for the period of type corresponding to 40,000 clocks is regulated by ISO.

The process for reading data from the asynchronous protocol type IC card 5a causes an output of data to be made in response to only supply of a cowand by using the keyboard 3. The output data is displayed on the liquid crystal display section 2.

As described above, whether the IC card inserted into the card insertion opening 4 is the asynchronous protocol type IC card 5a or the synchronous protocol type IC card 5b is automatically determined. Moreover, a reading process adaptable to a result of determination

is automatically performed. As a result, data can be read from both of the asynchronous protocol type IC card 5a and the synchronous protocol type IC card 5b. Thus, a satisfactory flexibility can be realized.

The synchronous type reading process, which is started in response to supply of the reset signal RST and the clock signal CLK, is initially performed. In accordance with data read in the synchronous type reading process, the IC card is determined. The asynchronous type reading process in which the waiting process for the period of time corresponding to 40,000 clocks regulated by ISO is performed to correspond to a result of determination of the IC card. Therefore, time required to determine the IC card, that is, time required to obtain read data can satisfactorily be shortened. It leads to a fact that the convenience for a user can be improved.

Although the invention has been described in its preferred form, it is understood that the present disclosure of the preferred form can be changed without departing from the scope of the invention.

Although the embodiment has been described about the portable terminal unit, the present invention may be applied to a desktop type terminal unit.

As described above, the terminal unit for IC cards according to the present invention is arranged in such a manner that a determination is made whether the inserted IC card is the asynchronous protocol type IC card or the synchronous protocol type IC card. Moreover, the reading process is performed to be adaptable to a result of determination. As a result, the terminal unit for IC cards exhibiting satisfactory flexibility can be provided which is capable of processing data of both of the asynchronous protocol type IC card and the synchronous protocol type IC card.

The method of controlling the terminal unit for IC cards according to the present invention is arranged in such a manner that a determination is made whether the inserted IC card is the asynchronous protocol type IC card or the synchronous protocol type IC card. Moreover, the reading process is performed to be adaptable to a result of determination. As a result, the method of controlling the terminal unit for IC cards exhibiting satisfactory flexibility can be provided which is capable of processing data of both of the asynchronous protocol type IC card and the synchronous protocol type IC card.

Claims

1. A data processing apparatus receiving portable mediums, the apparatus communicates with the portable mediums in a synchronous communication protocol and an asynchronous communication protocol, characterized by comprising:

   first Supply means (15, 16, S104) for holding one of the portable mediums and supplying a first clock signal to the held medium for the purpose of establishing communication with the portable medium in the synchronous communication protocol;

   means (11, S105, S106, S117, S107, S108, S113, S109) for determining whether the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with data transmitted from the held medium in response to the first clock signal;

   means (11, S110, S111) for continuing a subsequent communication with the held medium in the synchronous communication protocol when the determining means has been determined that the portable medium uses the synchronous communication protocol; and

   second supply means (11, S114, S115, S116, S118) for supplying a second clock signal to the held medium for the purpose of establishing communication with the portable medium in the asynchronous communication protocol when the determining means has determined that the portable medium uses the asynchronous communication protocol.

2. A data processing forming apparatus according to claim 1, characterized in that the determining means includes

   means (2) for reading the data from the held medium to display the contents of read data.

3. A data processing forming apparatus according to claim 1, characterized in that the first supply means includes

   means (15, 18, S102, S103) for supplying, to the medium, a reset signal and power source voltage which is power for operating the medium.

4. A data processing forming apparatus according to claim 1, characterized in that the determining means includes

   means (11, S105, S106, S117, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing and determining effective data by majority data; and

   means for determining that the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with the value of the effective data.

5. A data processing forming apparatus according to

claim 1, characterized in that the determining means includes

means (11, S105, S106, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing by performing reading operations odd-number of times and determining effective data by majority data; and
means for determining that the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with the value of the effective data.

6. A data processing forming apparatus according to claim 1, characterized in that the determining means includes

means (11, S105, S106) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing by performing reading operations odd-number of times and determining effective data by majority data; and
means (11, S105, S106, S117, S107, S108, S113, S109) for repeating the operation of the determining means plural times to determine that the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with the plurality of the determined effective data items.

7. A data processing forming apparatus according to claim 1, characterized in that the determining means includes

means (11, S105, S106, S117, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing and determining effective data by majority data; and
means for determining that the held medium uses the synchronous communication protocol when the plural effective data items are not common data and determine that the held medium uses the asynchronous communication protocol when the plural effective data items are common data.

8. A data processing forming apparatus according to claim 1, characterized in that the determining means includes

means (11, S105, S106, S117, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing and determining effective data by majority data; and
means for determining that the held medium uses the asynchronous communication protocol when all of the plural effective data items are 1 and determining that the held medium uses the synchronous communication protocol when all of the plural effective data items are not 1.

9. A data processing forming apparatus according to claim 1, characterized in that the determining means includes

means (11, S105, S106, S117, S118, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing and determining effective data by majority data; and
means for determining that the held medium uses the asynchronous communication protocol when all of the plural effective data items are not signals which are transmitted from a medium which uses the synchronous communication protocol and determining that the held medium uses the synchronous communication protocol when all of the plural effective data items are signals which are transmitted from a medium which uses the synchronous communication protocol.

10. A controlling method of a data processing apparatus receiving portable mediums, the apparatus communicates with the portable mediums in a synchronous communication protocol and an asynchronous communication protocol, characterized by comprising:

a first supply step (S104) for holding one of the portable mediums and supplying a first clock signal to the held medium for the purpose of establishing communication with the portable medium in the synchronous communication protocol;
a step (S105, S106, S117, S107, S108, S113, S109) for determining whether the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with data transmitted from the held medium in response to the first clock signal;
a step (S110, S111) for continuing a subsequent communication with the held medium in the synchronous communication protocol when

a determination has been made in the determination step that the synchronous communication protocol is used; and

a second supply step (S114, S115, S116, S118) for supplying a second clock signal to the held medium for the purpose of establishing communication with the portable medium in the asynchronous communication protocol when a determination has been made in the determination step that the asynchronous communication protocol is used.

11. A controlling method according to claim 10, characterized in that the determination step includes

a step (S107) for reading the data from the held medium to display the contents of read data.

12. A controlling method according to claim 10, characterized in that the first supply step includes

a step (S102, S103) for supplying, to the medium, a reset signal and power source voltage which is power for operating the medium.

13. A controlling method according to claim 10, characterized in that the determination step includes

a step (S105, S106, S117, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing and determining effective data by majority data; and

means for determining that the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with the value of the effective data.

14. A controlling method according to claim 10, characterized in that the determination step includes

a step (S105, S106, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing by performing reading operations odd-number of times and determining effective data by majority data; and

means for determining that the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with the value of the effective data.

15. A controlling method according to claim 10, characterized in that the determination step includes

a step (S105, S106) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing by performing reading operations odd-number of times and determining effective data by majority data; and

a step (S105, S106, S117, S107, S108, S113, S109) for repeating the operation of the determining means plural times to determine that the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with the plurality of the determined effective data items.

16. A controlling method according to claim 10, characterized in that the determination step includes

a step (S105, S106, S117, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing and determining effective data by majority data; and

means for determining that the held medium uses the synchronous communication protocol when the plural effective data items are not common data and determining that the held medium uses the asynchronous communication protocol when the plural effective data items are common data.

17. A controlling method according to claim 10, characterized in that the determination step includes

a step (S105, S106, S117, S107, S108, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal rising or a predetermined timing and determining effective data by majority data; and

means for determining that the held medium uses the asynchronous communication protocol when all of the plural effective data items are 1 and determining that the held medium uses the synchronous communication protocol when all of the plural effective data items are not 1.

18. A controlling method according to claim 10, characterized in that the determination step includes

a step (S105, S106, S117, S118, S113, S109) for reading the data transmitted from the held medium in response to the first clock signal every the first clock signal

rising or a predetermined timing and determining effective data by majority data; and

means for determining that the held medium uses the asynchronous communication protocol when all of the plural effective data items are not signals which are transmitted from a medium which uses the synchronous communication protocol and determining that the held medium uses the synchronous communication protocol when all of the plural effective data items are signals which are transmitted from a medium which uses the synchronous communication protocol.

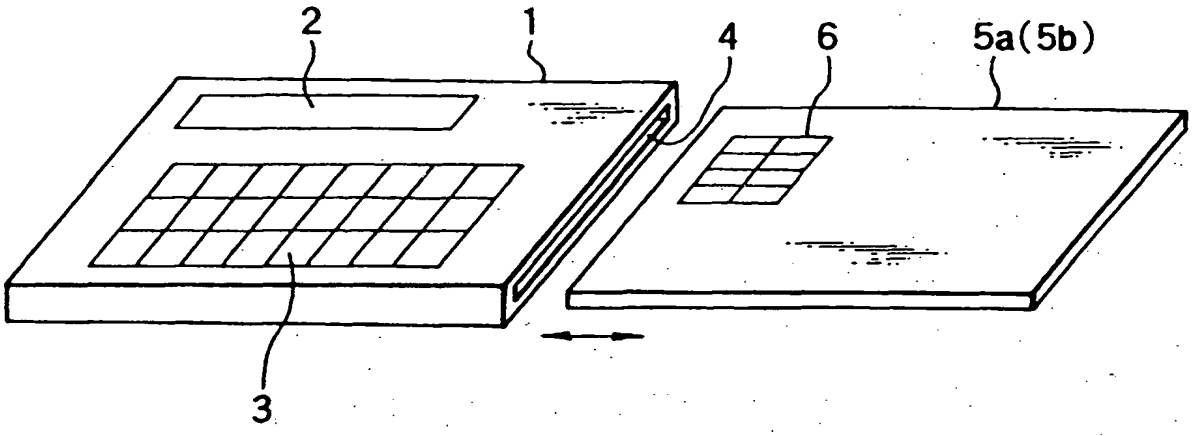

FIG. 1

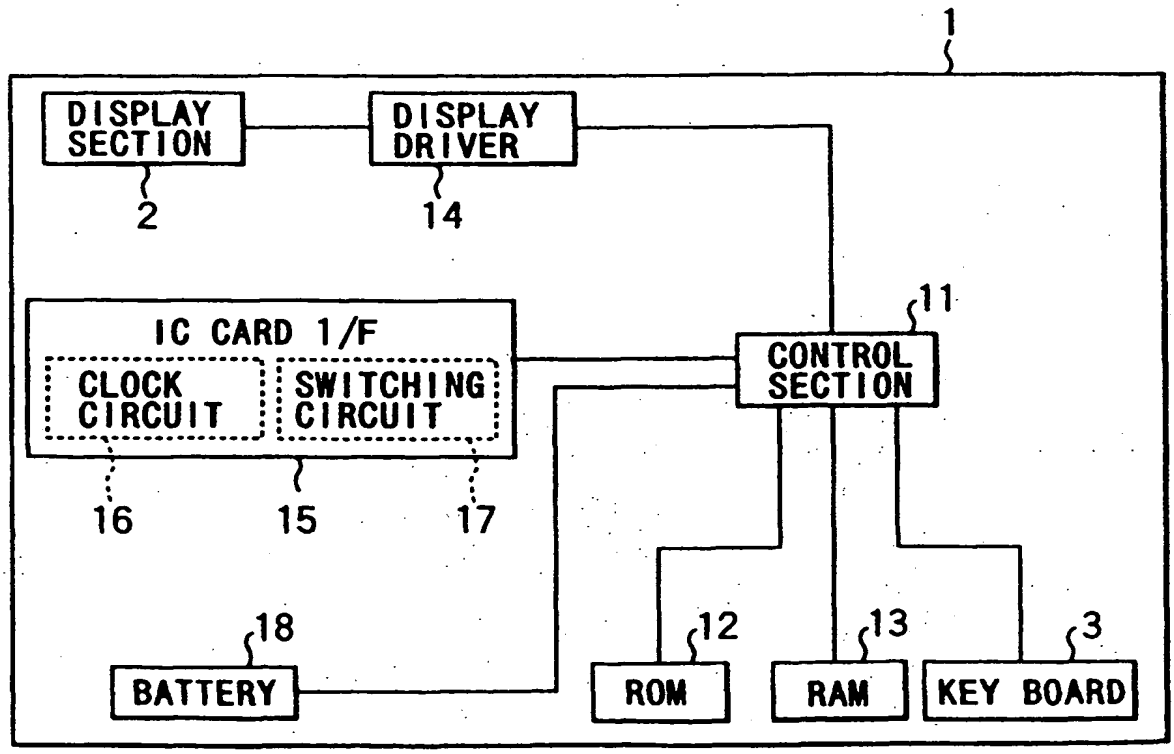

FIG. 2

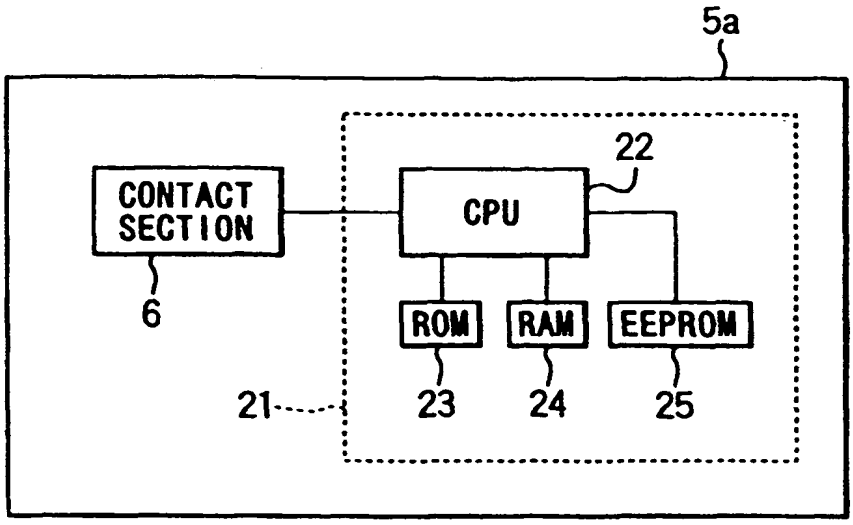

FIG. 3

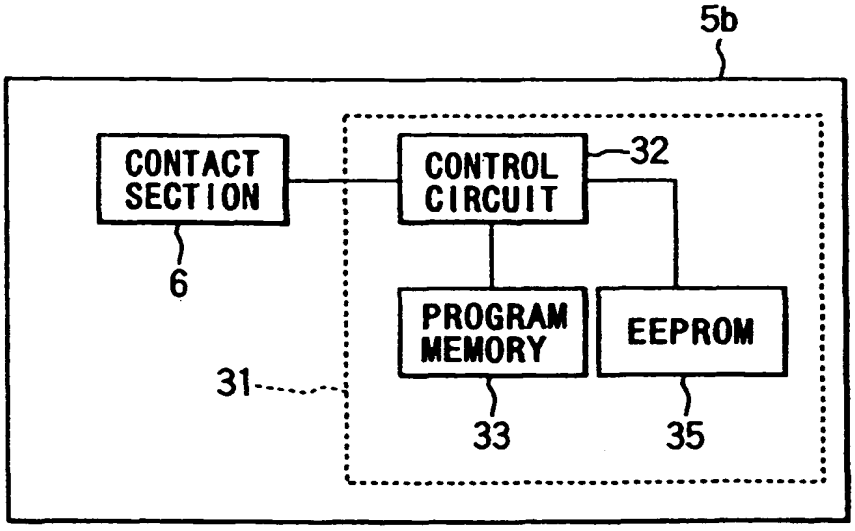

FIG. 4

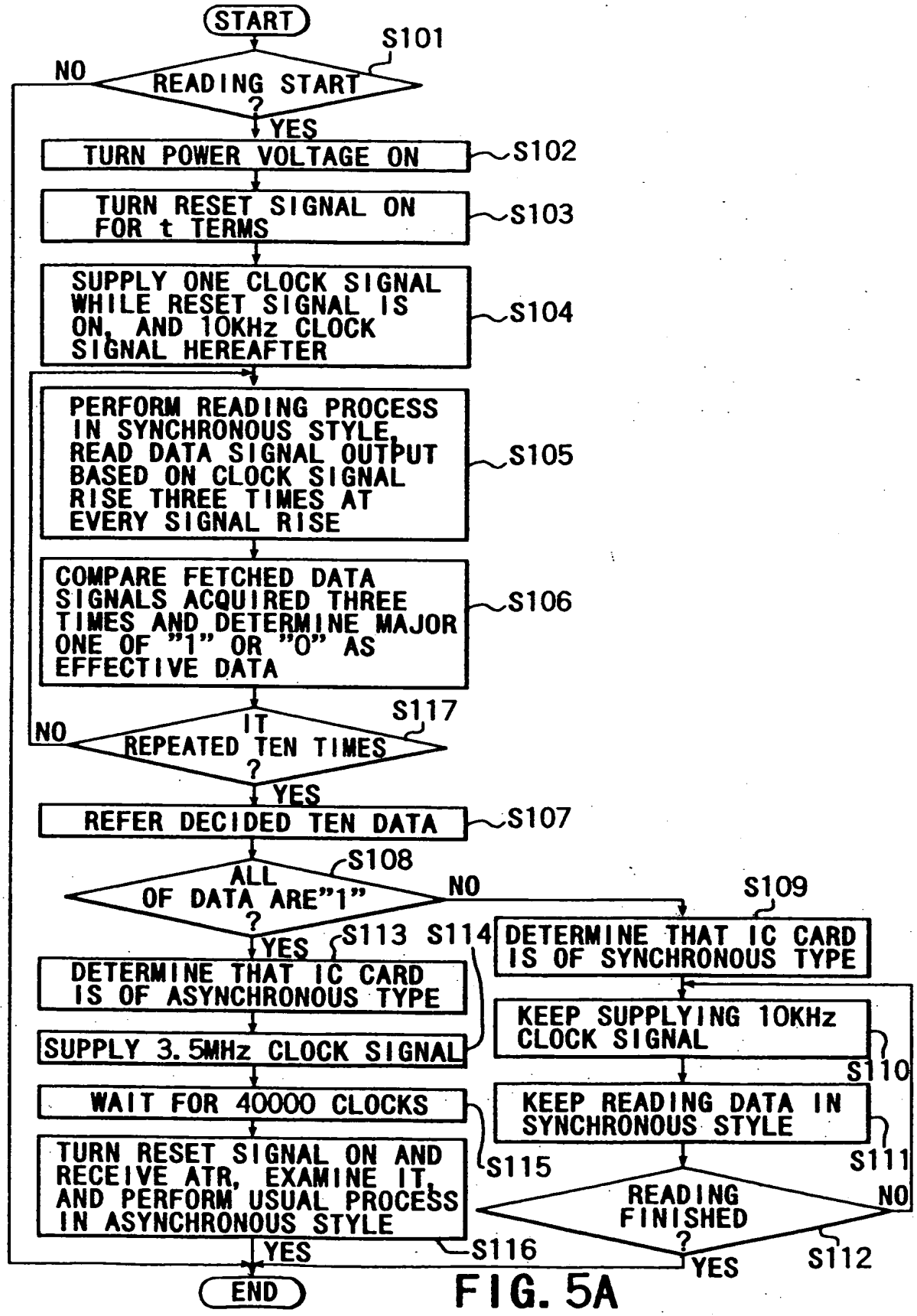

FIG. 5A

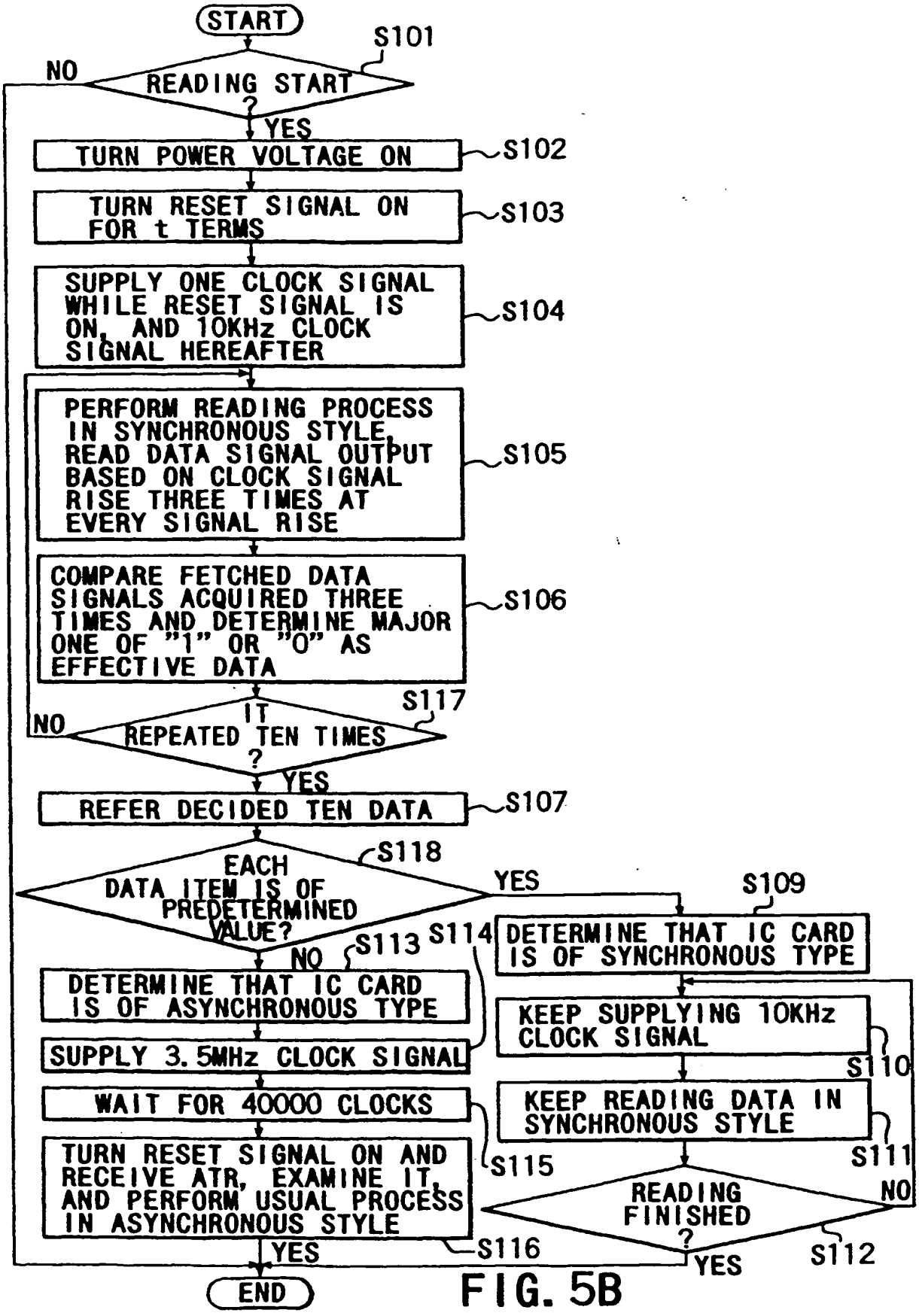
START
S101
NO
READING START ?
YES
TURN POWER VOLTAGE ON
S102
TURN RESET SIGNAL ON FOR t TERMS
S103
SUPPLY ONE CLOCK SIGNAL WHILE RESET SIGNAL IS ON, AND 10KHz CLOCK SIGNAL HEREAFTER
S104
PERFORM READING PROCESS IN SYNCHRONOUS STYLE, READ DATA SIGNAL OUTPUT BASED ON CLOCK SIGNAL RISE THREE TIMES AT EVERY SIGNAL RISE
S105
COMPARE FETCHED DATA SIGNALS ACQUIRED THREE TIMES AND DETERMINE MAJOR ONE OF "1" OR "0" AS EFFECTIVE DATA
S106
S117
NO
IT REPEATED TEN TIMES ?
YES
REFER DECIDED TEN DATA
S107
S118
EACH DATA ITEM IS OF PREDETERMINED VALUE?
YES
S109
DETERMINE THAT IC CARD IS OF SYNCHRONOUS TYPE
S114
KEEP SUPPLYING 10KHz CLOCK SIGNAL
S110
KEEP READING DATA IN SYNCHRONOUS STYLE
S111
READING FINISHED ?
NO
YES
S112
NO
S113
DETERMINE THAT IC CARD IS OF ASYNCHRONOUS TYPE
SUPPLY 3.5MHz CLOCK SIGNAL
WAIT FOR 40000 CLOCKS
S115
TURN RESET SIGNAL ON AND RECEIVE ATR, EXAMINE IT, AND PERFORM USUAL PROCESS IN ASYNCHRONOUS STYLE
S116
YES
END

FIG. 5B

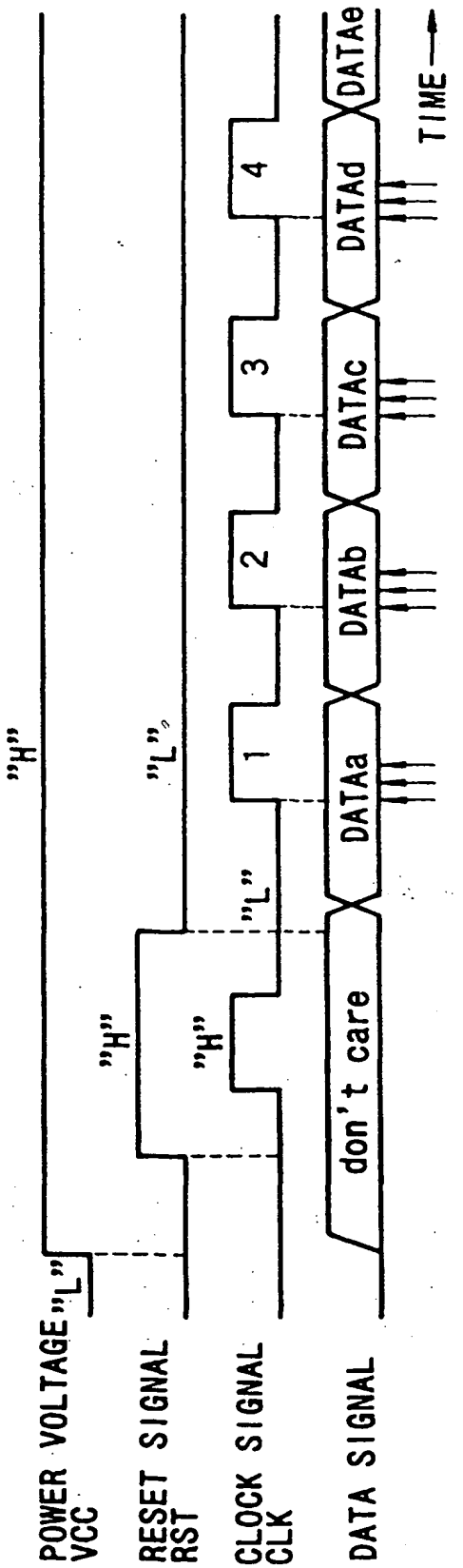

FIG. 6

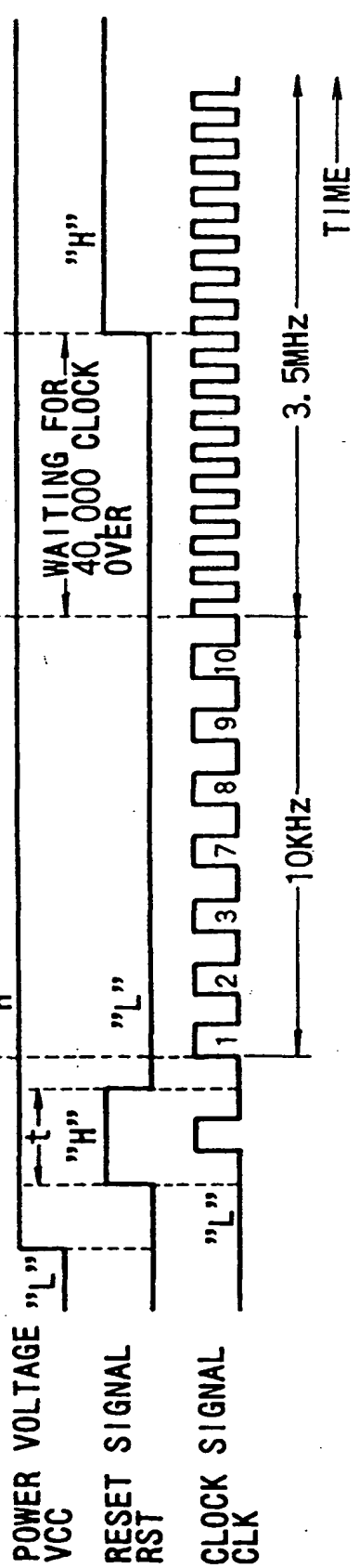

FIG. 7

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(54) Terminal unit for IC card using plural protocols and control method therefor

(57) A data processing apparatus for IC card mediums having a function (15, 16, S104) for holding one of the portable mediums and supplying a clock signal to the held medium for the purpose of establishing communication with the portable medium in the synchronous communication protocol, a function (11, S105, S106, S117, S107, S108, S113, S109) for determining whether the held medium uses the synchronous communication protocol or the asynchronous communication protocol in accordance with data transmitted from the held medium in response to the clock signal, a function (11, S110, S111) for continuing a subsequent communication with the held medium in the synchronous communication protocol when a determination has been made that the synchronous communication protocol is used, and a function (11, S114, S115, S116, S118) for supplying a clock signal to the held medium for the purpose of establishing communication with the portable medium in the asynchronous communication protocol when a determination has been made that the asynchronous communication protocol is used.

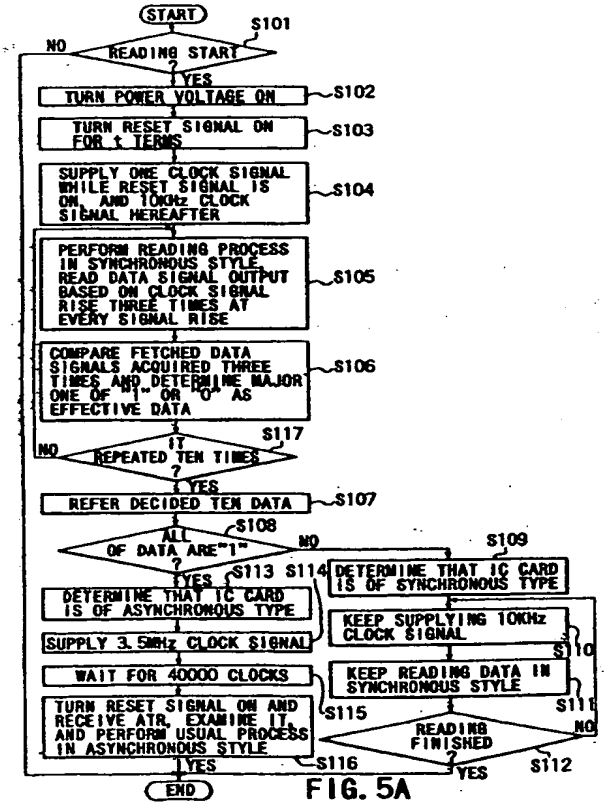

FIG. 5A

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	"Norme Internationale ISO/CEI 7816-3, Cartes d'identification - Cartes à circuit(s) intégré(s) à contacts. Partie 3" 15 September 1989 , ISO/CEI , GENEVA XP002082598 * page 1, column 1, line 1 - line 5 * * page 5 * * page 6, column 1, line 12 - line 15 * * page 7, column 1 * * page 11 *	1-18	G06K7/00
A	WO 95 04328 A (INTELLECT AUSTRALIA PTY LTD ;OLIVER QUENTIN REES (AU); BERTINA JOH) 9 February 1995 * abstract * * page 8 *	2,6,11, 15	
A	US 4 692 640 A (SUZUKI SEIGO ET AL) 8 September 1987 * column 1, line 6 - line 12 *	4,5,13, 14	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) G06K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 November 1998	Cardigos dos Reis, F

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